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ARTICLE TYPE

Power Users and Patchworking – an Analytical Approach to Critical Studies of Young People's Learning with Digital Media

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Abstract

This paper sets out to problematize generational categories such as 'Power Users' or 'New Millennium Learners' by discussing these in the light of recent research on youth and ICT. We then suggest analytic and conceptual pathways to engage in more critical and empirically founded studies of young people's learning in technology and media-rich settings. Based on a study of a group of young 'Power Users' it is argued, that conceptualising and analysing learning as a process of patchworking can enhance our knowledge of young people's learning in such settings. We argue that the analytical approach gives us ways of critically investigating young people's learning in technology and media-rich settings, and study if these are processes of critical, reflexive enquiry where resources are creatively re-appropriated. With departure in an analytical example the paper presents the proposed metaphor of understanding learning as a process of patchworking and discusses how we might use this to understand young people's learning with digital media.

Keywords: Power Users, Patchworking, Youth, Technology Enhanced Learning, Collaboration, ICT

Introduction

The aim of this paper is to discuss broad labels such as 'Power Users' or 'Millennial Learners' and to suggest ways of studying young people's learning in technology and media-rich settings from a more critical perspective grounded in empirical studies. The concept of 'Power Users' has emerged from an international project called 'Power Users of Technology' and is very similar to other concepts such as 'New Millennium Learners', the 'Net Generation' or 'Digital Natives' (Prensky, 2001; Tapscott, 1999). The concepts are quite in their definitions and can be used somewhat interchangeably, but since the research reported in this paper is associated with the 'Power Users' project we generally adopt this term in the paper.

What is common for these concepts is an assumption that societal transformations, globalisation and the massive diffusion of information and communication technology (ICT) have dramatically changed the conditions for learning, and that these societal transformations demand new competences and literacies. Furthermore, the concepts suggest that not only the conditions have changed; rather the young learners themselves have changed. Some claims related to the concepts are that the use of new technologies e.g. games and the web, have general effects upon the brain, behaviour and activities of an entire generation of young people which has resulted in particular effects on their ways of learning and the emergence of 'new literacies'. Therefore, a prevalent idea is that the changed conditions should be reflected in the ways institutional or

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formal learning is organised to accommodate to the learning patterns represented by this new generation of learners. Even though ideas of these unfolding changes are widespread, there is actually not much research-based knowledge on this generation *as learners*; especially we lack in-depth, empirical studies of how this group of learners approaches actual learning situations (Bennett *et al.*, 2008). This paper is going to report on such a study which is empirically rooted in activities carried out as part of the 'Power Users of Technology' project.

As part of the project six teams of young people from different countries were brought together in an international symposium supported by UN and Educational Development Center (EDC). The symposium took place in San Juan, Costa Rica in August 2005 with teams coming from Australia, Philippines, Taiwan (online only), Denmark (called the Nordic team), US, Latin America, and European countries. During the symposium, the young people worked in their teams with one of the UN Millennium goals: e.g. Environment, poverty and education. The paper is based on a detailed interactional investigation of the Nordic team's work and learning process during the Costa Rica symposium (Ryberg, 2007). The detailed investigation covered in particular a three days, intensive learning process where eight young people (age 13-16) worked collaboratively on solving the open-ended problem of 'How to reduce poverty through the use of technology'.

Out of this investigation grew the notion of metaphorically understanding learning as a process of patchworking (Ryberg, 2007) In short, the metaphor of patchworking aims at highlighting how learning processes and processes of knowledge creation can be conceptualised as stitching and weaving together different 'patches and pieces' into something new. The metaphor represents a particular view of learning that foregrounds constructive, creative and productive aspects of learning, while also suggesting specific ways of analytically approaching learning processes. It suggests we can view learning as processes of continuously assembling and reorganising multiple patches and pieces into provisional patchworks, which are then made into a 'final', new patchwork. The ideas presented in the paper feed into a wider (and necessary) debate of whether young people's use of ICT in relation to learning is a mindless exercise of copy-paste behaviour or if it consists in creative re-appropriation of resources and generation of new knowledge. We engage with this question, not by resolving or answering it, but by presenting an analytical and theoretical vocabulary to critically investigate technology mediated learning processes. We argue that it is not the 'final product' or 'patchwork' in itself, which should be the object of analysis. Rather, the analytic focus is to investigate how, when and why various resources (or 'patches and pieces') such as ideas, arguments, pictures or web-texts are stitched together into provisional patchworks, which are then combined, reorganised, negotiated and assembled into a 'final' patchwork. Thus, we argue how the proposed metaphor of understanding learning as processes of patchworking can enhance our knowledge of young people's learning, and how it enables us to critically analyse their learning processes in technology and media-rich settings.

The article is structured in the following way. We begin the article by critically discussing labels such as 'Power Users', 'New Millennium Learners', 'The Net Generation' or 'Digital Natives' in the light of recent research on youth and ICT. Following this we will present the case study and based on an example of analysis, we will introduce the notion of patchworking. Finally, we discuss what we can learn from this study about 'Power Users' and about studying learning processes taking place in technology-rich settings where multiple media and resources are incorporated.

Perspectives on the study of youth and technology

From the very childhood many kids are exposed to ICT and digital media. Some explore and use professional tools, are used to communicate and collaborate in global virtual communities and many young people move

seamlessly between online and off-line settings (this to a degree where the very distinction loses its meaning (Ryberg & Larsen, 2008)). It is against this backdrop we should understand the intensified interest for the potential of Power Users or New Millennium Learners.

In the beginning of 2000, on the initiative of Educational Development Center (EDC) in Boston (USA), a global initiative was initiated in order to start a long term and global research project on young people, technology and new ways of learning. The idea was to establish a 20 - 25 year longitudinal and comparative study of Power Users to study how they developed cognitively, socially, professionally and culturally. The project was called "Power Users of Technology" and was lead by an international board of researchers, business people and educators. The project went very well in the first phases and one of the outcomes was the Costa Rica Symposium which was a first step in the long-term research process envisioned. It has, however, turned out to be more difficult to find the resources for the longitudinal and comparative study than first anticipated.

The Power Users Project is far from the only project studying the learning potential of young people in relation to their use of technology and media. In Denmark research groups from the Danish University School of Education have participated in numerous research projects on kids' informal/formal learning and digital technologies, as to inform the design of future education (Holm Sørensen, 2002, 2001; Holm Sørensen *et al.*, 2002; Jessen, 2002). In the UK a number of projects have been conducted to investigate children in pre-university age groups, and is now being extended into a pan-European context (Livingstone & Bober, 2005; Livingstone & Bovill, 2001). Moreover, another large UK study (Facer *et al.*, 2003) has made a number of important findings in relation to youth and digital technologies. In the US a number of different groups are working with various aspects of youth and new media. The PEW Internet Research Group study the digital aspects of American life and have produced many interesting quantitative studies and reports on youth and their use of technology (Lenhart & Madden, 2005; Lenhart *et al.*, 2005). Recently the MacArthur Foundation has initiated and funded a large, and more qualitatively oriented, research project focusing on youth, learning and new digital media (called Digital Media and Learning). Likewise, they have funded a research project on New Media Literacies (Jenkins *et al.*, 2006). For one thing, such initiatives are undertaken to better understand the perspective, style and approach of the new learners, as to design education for the future generation. Secondly, they are initiated to ensure that the educational sector reflects and supports the development of the competences which are supposedly needed in the knowledge and learning society (Dirckinck-Holmfeld *et al.*, 2008 Forthcoming; Ryberg, 2007).

While we believe that there are very good reasons to intensively study youth and their use of digital technologies, we would raise some concerns with labels such as Power Users, the Net Generation, Digital Natives or New Millennium Learners. Claims related to generational discontinuities have gained some popularity through e.g. the notion of Digital natives as opposed to Digital immigrants (Prensky, 2001). In general the claims about the Net Generation can be summarized as: New technologies, primarily games and the Web, have general effects upon the brain or behaviour and activities of a generational cohort, which also have particular effects on learning and our design for education. Such generational discontinuities have for instance been highlighted by (Jukes & Dosaj, 2006, p. 44-45):

Table 1: Generational discontinuities – Digital Natives vs. Digital Immigrants	
Digital Native Learners	Digital Immigrant Teachers
Prefer receiving information quickly from multiple multimedia sources	Prefer slow and controlled release of information from limited sources

Prefer parallel processing and multitasking	Prefer singular processing and single or limited tasking
Prefer processing pictures, sounds and video before text	Prefer to provide text before pictures, sounds and video
Prefer random access to hyperlinked multimedia information	Prefer to provide information linearly, logically and sequentially
Prefer to interact/network simultaneously with many others	Prefer students to work independently rather than network and interact
Prefer to learn “just-in-time.”	Prefer to teach “just-in-case” (it’s on the exam).
Prefer instant gratification and instant rewards	Prefer deferred gratification and deferred rewards
Prefer learning that is relevant, instantly useful and fun	Prefer to teach to the curriculum guide and standardized tests

While there may be some grounding for changes and discontinuities, we would argue for a somewhat more critical view on such generational metaphors. Recent research on youth and ICT suggest that we should be careful in talking about a new generation or homogenous cohort of young people. There is indeed empirical evidence and indications showing that youth in many ways have better digital competences and more quickly appropriate new technologies in creative and innovative ways (Facer et al., 2003; Holm Sørensen *et al.*, 2001; Holm Sørensen et al., 2002). However, there is equally evidence showing that young people are using ICTs in very diverse ways and for widely different purposes. Furthermore, that they have very differentiated experiences, competences and varied access to ICTs, and the possibilities for using them. While we often speak of ‘the digital divide’ between developed and developing countries, there are equally digital divides within countries that seem to largely follow traditional or existing socio-economical and cultural divides (Facer et al., 2003; Jenkins et al., 2006; Livingstone, 2002a, 2002b). In a recent publication (Bennett *et al.*, 2008) critically summarise the debate in the following way:

“[...] we have examined the key assumptions underlying the claim that the generation of young people born between 1980 and 1994 are ‘digital natives’. It is apparent that there is scant evidence to support this idea, and that emerging research challenges notions of a homogenous generation with technical expertise and a distinctive learning style. Instead, it suggests variations and differences within this population, which may be more significant to educators than similarities.” (Bennett *et al.*, 2008, p.6)

We should therefore be critical of broad concepts such as the Net-Generation, Digital Natives or Power Users and reflexive of whom such terms will benefit or disadvantage (here it should be mentioned that one of the research questions in the Power Users Project was to address whether there is a ‘generation’ of power users, or whether they represent a smaller group of pioneers). Also, we should be careful in assuming that youth will automatically develop critical, reflexive skills or literacies through informal or intensive use of technology. As (Facer et al., 2003) argue, these are often learned through formal schooling. Even though, youth may be skilled at collecting a variety of resources, bringing them together and create impressive assemblages of media and modalities we need to critically assess such products. As Jenkins et al. (2006) point out:

“Guinee and Eagleton (2006) have been researching how students take notes in the digital environment, discovering, to their dismay, that young people tend to copy large blocks of text rather than paraphrasing it for future reference. In the process, they often lose track of the distinction between their own words and material borrowed from other sources. They also skip over the need to assess any contradictions that might exist in the information they have copied. In short, they show only a minimal ability to create a meaningful synthesis from the resources they have gathered.” (Jenkins et al., 2006, p. 51)

On basis of this, we would argue that there is a need to further develop our theoretical, analytical and methodological approaches for studying youth and ICT, and to firmly ground our claims in empirical investigations. In this paper we argue that the metaphor of understanding and analysing learning as processes of patchworking might be one fruitful avenue for such investigations.

Case description and methodology

The investigation and the young people's learning process were situated within the larger event and symposium arranged as part of the 'Power Users of Technology Project'. Within this frame our research team aimed at enabling a pedagogical design built on an open-ended problem oriented inquiry, controlled and driven largely by the eight young people. This was inspired by the approach called the "The Aalborg PBL Model" (Kolmos et al., 2004) or "Problem Oriented and Project Pedagogy" (Dirckinck-Holmfeld, 2002) which is the pedagogical foundation of Aalborg University. Rather than designing sequenced events and controlling in detail what they should learn and how to organise their work, we were more concerned with creating a relatively open setting for the young people to act in. We did, however, arrange some interviews and a lecture in advance. Also we provided them with four Tablet PCs, a Mac notebook, two video-cameras (which were also used to collect our video data) and a mini-disc recorder. For the computers we made sure that basic office applications and video-editing software were available, but they did not receive any special training or instructions on how to use the software (but during the symposium we supported them when needed).

Our group's research design focused on qualitative methods and was an ethnographically inspired open-ended, explorative investigation based on intensive participatory observation and documentation of their work. During the symposium we acted both as observers/researchers, but also as facilitators/helpers. In relation to the latter our role increasingly became that of practical helpers, as the young people gradually took more and more ownership of the process and the organisation of work. Our research questions were relatively open-ended and we viewed the event as a setting for exploratory research, rather than testing pre-defined hypotheses. Some of the main research questions were: *How do Power Users carry out tasks, collect resources and information and how do they use other people, the internet and various technological tools in their practical problem solving? How do they organise their work and how does technology play a role in this?*

The data collected during and after the symposium were: Field notes from the participatory observation; eight individual interviews and two group interviews with the young people; collection of hand-written notes and digital notes and documents from the Tablet-PCs they used. Most of their work was quite extensively documented, as we recorded approximately 20 hours of video. In the following we will give a brief, narrative account of the entirety of the learning process and a short description of their final presentation.

Description of their work, learning process and final presentation

Even though some work was conducted ahead of the symposium they did not have much to work with when arriving in Costa Rica. They had mainly some vague ideas and conceptualisations of poverty, and how to address, define and work with their problem. Their work began in the evening on the 7th of August, where they created interview guides for some expert interviews, and it culminated on the 10th of August where they presented their work to the symposium attendees. Most of the time they all worked in a room, kindly provided by Universidad Nacional, but also they went out to interview various resource persons and experts. They interviewed two researchers: Ricardo Monge, professor of International Trade at Universidad Latina de Costa Rica, who is also Executive Director of the Costa Rican High Technology Advisory Committee (CAATEC) and Manuel Bersone, professor of economy and social politics, who works as a consultant for UNICEF. Furthermore they interviewed a manager of the Intel Clubhouse in San Jose (Laura Aijalla) and one of the users of the Clubhouse (Cynthia). Moreover, they had a small lecture on poverty, which was given by two

local researchers (Mauricio Dierckxsens and Keynor Ruiz). The Nordic Team's final presentation was called 'How to improve a poor society' and the picture below is from the presentation.



Figure 1: Their final presentation

From the picture one might be able to sense that the presentation was heavily multi-modal and combined many different media and resources. On one of two projector screens a slideshow with looping pictures of 'poor people' was displayed, while they used the other screen for their main PowerPoint presentation. Their presentation was composed of multiple media and resources, such as: music, pictures, a self-made cartoon-like animation, small video clips from the interviews (some of them subtitled) and also different graphs with statistical information about poverty. All accompanied by their oral presentations. The many resources, ideas and arguments came from various sources.

Some of the graphs used in their own presentation came from the PowerPoint presentation used by the local researchers in their lecture; facts and information came from various web pages and books. Ideas and arguments came from the interviews, but also from informal conversations (e.g. with a young guide during a bus ride). The four different interviews they conducted were recorded, edited and made into small video-clips, which were used as part of the presentation. Pictures of poor people were found through image search on the web, while the graphical elements in the animation were hand-drawn in Paint and animated in PowerPoint.

In this way the entire presentation was a 'patchwork' of many different resources and media which were assembled to convey their conceptualisation of poverty, and how to address this problem. However, the presentation was also a conceptual patchwork that drew on information, facts, discussions and ideas from a variety of sources, which were assembled and orchestrated into a coherent line of argumentation. The presentation outlined an overall argumentation focusing on 'taxes' and 'education', but also many other issues were drawn in as causes of or solutions to poverty (e.g. corruption and lack of secondary education). While it is difficult to convey the full complexity of their arguments, the presentation and the whole process, the next section aims at illustrating this through analysing a smaller part of the whole.

Analytic concepts and analysis of patchworking processes

As mentioned their final presentation was both a very complex and impressive assemblage of different media and resources, as well as arguments and lines of reasoning. Apart from the earlier mentioned research questions a guiding question became to *critically investigate, whether the process was a mindless exercise of copy-paste behaviour, or if it was a creative, innovative and challenging process? Was it a process of knowledge construction and not merely re-production?*

In this particular case the young people collected quite a number of different resources from the web and also from e.g. the PowerPoint show of the researchers, who gave them the lecture on poverty in Central America. From this we can critically ask whether their entire presentation was just an example of copy-paste behaviour and plagiarism, or whether it was in fact a creative re-appropriation of different resources. In the subsequent analysis we shall take up an example illustrating how the presentation came about and how ideas and

resources were woven into their patchwork. Initially, we shall briefly present some of the analytical concepts through which processes of patchworking can be analysed.


One such concept is threads, which are employed in the analysis to point to some ‘organising principles’ or ‘persistent ideas’ in their work. Prominent threads were for an example the problem formulation (their research question) and their presentation as an emergent object. The concept of threads also refers to some prominent ideas that were present throughout their work. For instance, they considered “education” as an important factor in decreasing poverty, which became a prevalent idea or hypothesis guiding their enquiries throughout the process. The hypothesis, however, developed from a more general ‘education is good’ towards a more elaborated and complex understanding: ‘education can be statistically shown to have a major impact on poverty and is a key condition for civic engagement and democratic participation in a society’. Threads are thus ‘persistent ideas’ around which ‘patches and pieces’ such as ideas, interpretations, arguments, information, facts or digital files start to cluster and form provisional ‘patchworks’. As the process progressed they developed an increasingly refined sense of the relations between their different ideas, hypotheses and their overall problem. This can be seen as the gradual development of a ‘conceptual blueprint’ for their overall patchwork.

Furthermore, an analytic entrance point is to look at different moments or cycles in the flow of the activities where this conceptual blueprint is stabilised or destabilised. Destabilisations lead to moments where patchworks at different levels of scale are unravelled, inspected and rewoven. In the following analytical example we shall try to convey a sense of the complexity of their work in negotiating, discussing and weaving different resources into the flow of their activities and illustrate how their presentation and arguments slowly emerged from this entanglement of resources and ideas.

Planning, weaving and re-weaving a provisional patchwork

The excerpt below took place on their first full day of work. On the night before they worked in smaller groups of two to four people where they created some preliminary interview guides and discussed some ideas for the presentation. We enter the example where they have been discussing two suggestions for the final presentation. One suggestion is a role-play involving the audience, the other a movie-based or cartoon inspired animation. One of them suggests that they can provide the narratives of the interviewees through a ‘matchstick man’ animation and another suggest they should film the interviews. When discussing different media and modalities this quickly turns into involving also the very fabric of their problem and approach.

Table 2: Excerpt from their discussions on the 8th of August 2005

	Jack:	Yeah yeah so if we are going to do some interviews it is a damn good idea doing those with a movie because it doesn't take as much time either, and then people can better understand it
	Angie:	Yeah
	Jack:	Instead of us standing there reading something aloud for example
	Angie:	So we could do something (gestures) a combination of it all?
	Jack:	Yeah, where we incorporate many different things
	Angie:	Should we vote?



Neil: I mean...

Sophia: Aahh but can we just- ok, so we want to do something with that one with the matchstick men (2.0) OK, I have to admit I see it like- I mean the matchstick men for tax and education and then drag in some pictures with persons and then make it into a real story, and then interviews where we take and put on what they are looking at

Diana: Yeah, but also because one of the things we wrote yesterday Neil and me was that we must keep in mind the connecting thread, because else you won't be able to follow then it will just be all kinds of different things like ok [and then

Jack: [No no no we of course have to maintain the connecting thread and that is also why at all times we have to look at our problem definition, these are just the means to make it look easi- I mean to, I'll just try again- they are the means so it becomes easier to see

Laura: Yeah

Sophia: To understand

Laura: But now you say problem definition, what is our concrete problem definition, because we don't have one at the moment

Neil: (inaud)

Samuel: No

Laura: We have all these overarching- or sub questions and like an idea of what it should be, but if at all times we should maintain a connecting thread then I think it is really important to have a problem formulation- that is a sentence we keep getting back to- can the things be connected and is it coherent

Sophia: Yes, yeah it must [be coherent

Initially we can see how they are discussing different media and modalities for their presentation. Jack's comment that pure text or 'just talking' would be boring, highlights their very multimodal ways of expressing themselves - not only in images, movies and audio, but also through constructing a narrative composed of 'many different things'. Sophie tries to organise this by summarising her perspective of the relations between the presentation and their problem. Here she mentions 'taxes' and 'education', which were prevalent threads through their enquiry. These emerged initially as part of the small-group discussions on the night before, where they created questions for the expert interviews. In one of the groups they structured their interview guide into three overarching topics (threads) (taxes, education and jobs). The next day, as the result of a longer discussion and brainstorm, these 'categories' were reified as a shared representation for the whole group on a whiteboard. These threads then functioned as organising principles for their enquiries and represented persistent ideas or hypotheses of causes and solutions to poverty throughout the entire process.

These considerations on the threads, causes and solutions become tightly woven together with their ideas on which media and means to use as part of their presentation. For instance, in this excerpt we see how Sophia tries to link the different media more tightly with the problem and the threads by making an account of how she sees the relations between the different presentational forms and then taxes and education. On basis of this, and the idea that 'they can just combine a lot of different things', Diana raises a concern and argues that they need to keep in mind the connecting thread. Here she moves the focus from the presentational means onto the problem and solutions. Jack agrees that they should not lose track of the problem definition, but makes a distinction between discussions of the problem, the connecting thread and then the presentational

means. Here we should note, however, that the presentational means are not just 'bells and whistles', but as Jack frames it: means to 'explain and communicate the message'. However, Laura comments that she does not think they have a sufficient description of their problem, which she argues should be a core question around which their enquiry should revolve. Their emerging understanding of the relations between hypotheses, problems and the different threads is what we call 'the development of a conceptual blueprint'. The conceptual blueprint acts as an ephemeral and continuously negotiated blueprint of the relations between causes, solutions, ideas, hypotheses and arguments. In this way it represents an unstable model of what their final argument and presentation should encompass and address. Laura's critical comment leads to a longer process of inspecting their conceptual blueprint, as it opens to re-negotiations of what actually constitute their whole problem and their way of approaching the problem. While this cannot be seen from the small excerpt their discussions become negotiations of the relations between problem, solution and causes, as they start to discuss and pose different questions: how can education reduce poverty? Do taxes need to be higher to ensure better education, and how would a higher taxation affect international companies' investments in Costa Rica?

Such discussions we see as a way of unravelling their provisional patchwork and recombining 'patches and pieces' in new ways, thereby reorganising the conceptual blueprint of their presentation and their overall line of argumentation. Laura's comment foregrounds a discussion of whether they do have a stable representation of the problem, and a connecting thread that can stitch together the different patches and pieces they have (or may find). The discussion of whether they have a stable and shared representation now becomes their entry into querying and critically assessing the unstable and provisional patchwork. At the same time this reweaving of their patchwork is entangled with their ideas of how to present, construct and create a narrative that reflects their conceptualisation of the problem and what media and modalities to use.

Even though the excerpt represents only a small glimpse into a much longer discussion and process it provides an idea of how we can empirically approach questions of copy-paste behaviour versus creative re-appropriation in technology-rich settings where multiple resources and media are part of the learning process. For one thing it shows a glimpse of how they carefully negotiate the media and modalities in relation to their problem and hypotheses. Furthermore, it shows how these different presentational means are not only flashy 'bells and whistles', but are seen as ways of communicating and reflecting their conceptualisation of the problem and its solutions. This also tells us that the media, resources, arguments and ideas are not uncritically or haphazardly stitched into their presentation and their conceptual blueprint. Rather these provisional patchworks are negotiated, unravelled, inspected and rewoven through their discussions. In this way the relations between content and form are continuously and dynamically negotiated and constructed.

Concluding discussion

As we initially pointed out, we should be careful in assuming that we are dealing with a 'uniform generation' or homogenous cohort of highly ICT-literate young people. Likewise, we cannot assume that youth's (often) playful and experimental use of ICT will seamlessly translate into complex, creative and productive competences or learning capabilities. Rather, we need to study if, how and under what conditions such capabilities do unfold, and how they may be nurtured and developed. Furthermore, we need to firmly ground our hypotheses in empirical investigations at different levels of scale. In this paper we have presented one way of engaging empirically with youth and their use of digital media on a detailed, relatively fine-grained level of analysis.

When looking at the example in the analysis it is clear, that their skills are not restricted to media literacies. They also exhibit critical and reflexive abilities where they can relate the multimodal forms of expression with

their conceptualisations of the problem, the solutions and construct a coherent line of argumentation. They are dependent on mastering technologies with a relatively high-level of technological skill, but it is simultaneously a question of having the competences to: Construct a coherent narrative, organise, collaborate, orchestrate a complex work process, creatively master various multimodal forms of expression, while simultaneously being able to relate the 'form' to the 'content or substance'.

In studying young people's learning in media and technology rich settings, we believe it is important to shed light on how they actually work with digital media in concrete learning situation. For one thing this is important to understand and recognise the complex media literacies that some (or many) young people possess, but also to elicit under what conditions these literacies might best unfold and how we can nurture, support and develop them. For instance, some of the insights from the particular case might be especially connected to or dependent on the very problem-oriented and open-ended learning design. Secondly, in studying young people's learning with digital media, we believe it is important to investigate whether the learning is of a critical, reflexive nature where resources are creatively re-appropriated, or whether it reflects uncritical copy-paste behaviour and knowledge re-production. In this particular case, the learning process was a critical and reflexive enterprise, where resources were creatively re-appropriated and stitched into a new patchwork or knowledge artefact. However, whether such processes are critical and reflexive, or whether they reflect uncritical copy-paste behaviour and knowledge reproduction is an important empirical question when studying young people's learning with digital media.

We would argue that the metaphor of understanding learning as a process of patchworking, and the approach of analytically following and investigating closely such learning processes, provides an idea of how we can empirically engage with the questions above. For one thing the analytical approach gives us a way of engaging in detailed studies of learning in media rich setting to understand and recognise complex media literacies; and how digital media can afford and further develop these. Simultaneously, it provides us with a critical analytical perspective. By looking at how multiple resources and media are made part of the learning process, and by following how argumentation, hypotheses and solutions develop, we can investigate how (or if) the patchworks of media, ideas, resources, arguments, hypotheses and solutions are negotiated, unravelled, inspected and critically rewoven through their discussions.

The notion of understanding learning as a process of patchworking is a perspective that foregrounds constructive and productive learning processes. Rather than focusing primarily on the products in themselves the analytical focus is on the processes through which patchworks or knowledge artefacts are constructed. It suggests an analytical perspective that closely examines how technologies and digital media afford learning processes, and how these are creatively mobilised in concrete settings where learners produce and stitch together 'knowledge artefacts' or 'patchworks'. Thus, the perspective sits within the broader umbrella of socio-cultural theories, where the relations between cultural artefacts, social practices and cognition are emphasised. The strong focus on constructive and productive learning processes draws on notions such as expansive learning (Engeström, 1987) or concepts of knowledge creation (Paavola *et al.*, 2004). However, as also (Paavola *et al.*, 2004) note, the theory of expansive learning focuses very much on large-scale developmental changes e.g. in organisations and on the wider societal or cultural impact of the learning processes. As a supplement, the perspective presented here suggests pathways to analyse and conceptualise shorter and more modest learning processes as cases of knowledge creation or expansive learning. Such a perspective, we would argue, is important in enhancing our knowledge of young people's learning with digital media, but also to appreciate, nurture and develop the complex skills and literacies that some young people do have.

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